Kenya Avocado Industry Support Programme (KAISP)

# Technical Note 2: Oriental Fruit Fly (*Bactrocera dorsalis)*

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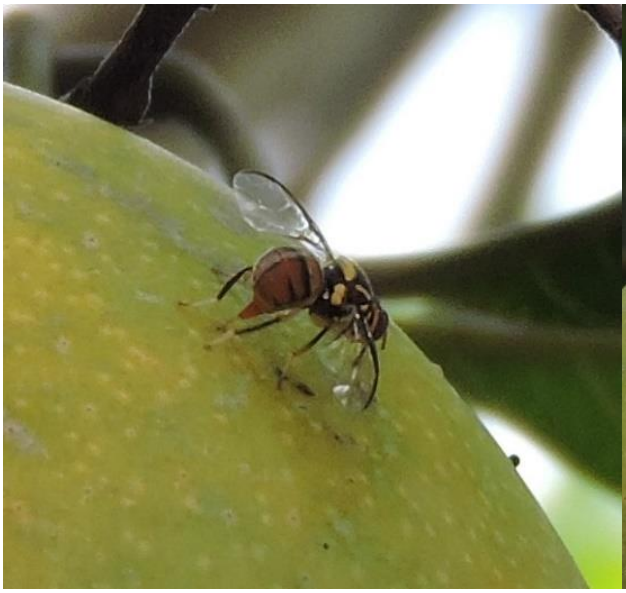

*Figure 1. Fruit fly laying eggs in mango*

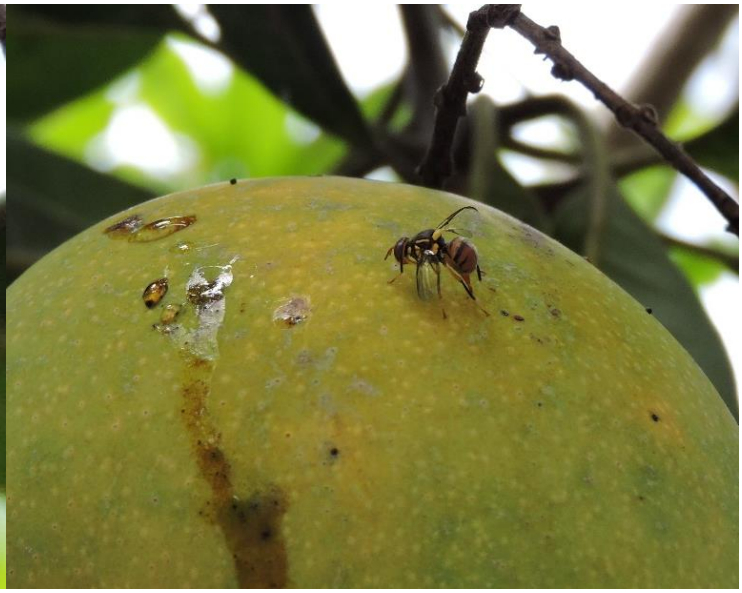

*Figure 2. Sap weeping from oviposition puncture wounds*

Oriental fruit fly **(***Bactrocera dorsalis***),** previously known in Africa as *Bactrocera invadens*, is a small, attractive fly, that is slightly larger than a house fly but a highly destructive pest in many parts of the world. It is a tropical species that is widespread through Southern Asia and can also be found in Africa, Hawaii and Florida, USA. It is known to attack more than 400 varieties of fruits and vegetables, including both temperate and tropical crops. Its presence in a country creates a major barrier for access to export markets in countries that do not have the pest. Special crop production protocols and disinfestation methods (Import Health Standards) have to be met in order to export host fruit species to countries free of the pest.

Normally, fruit fly lay eggs only in ripe or nearly ripe fruit (Figure 1). Because avocado do not ripen on the tree, fruit fly is seldom the cause of fruit rot in avocado. However, they do lay eggs in green avocado leading to star-shaped cracks and corky spots on the fruit, often with white sap exudates. This cosmetic damage makes the fruit unmarketable. Fruit fly is a major problem with most other fruit crops (e.g. pawpaw, mango, banana, guava, citrus) in Kenya and knowledge of control methods would help farmers to increase marketable yield of those crops.

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## Symptoms

Typical symptoms in ripe fruit e.g., mango, are a soft brown watery rot of the pulp. Infested fruit ripen prematurely and fall to the ground. The rotted flesh of the fruit contains large numbers of white to cream maggots up to 10mm long. The affected fruit are inedible and unmarketable. Entire crops can be lost because of fruit fly.

## Life cycle

Female fruit flies lay eggs just under the fruit skin in batches of up to 30 eggs at each oviposition site. The eggs hatch within 24-48 hours (at 25°C) and burrow though the flesh of the fruit. Larvae mature in 11-15 days and move to the surface of the fruit where they curl up and flick themselves off the fruit onto the soil. There they burrow in 2-3cm and pupate. The adults emerge from the pupae in 8-11 days. They become sexually mature in 8-12 days at which stage they mate, and females begin to lay eggs. Females can live for several months and can lay up to 1500 eggs over that time. Adult fruit flies are strong fliers and can disperse and establish new infestations over wide areas in a short time.

## Control

In the past control of fruit fly was dependent on the use of insecticides that penetrated into the fruit; particularly those containing the active ingredients carbaryl and dimethoate. These insecticides are highly toxic to humans and also eliminate many beneficial insects; they are therefore being withdrawn from sale or banned in many countries.

Routine control of fruit flies now uses a combination of:

- **male lure baits** to detect males and indicate fruit fly activity,
- **female bait sprays** to kill females before they lay eggs in fruit and
- **rigorous orchard hygiene** to remove and destroy infected fruit to prevent new flies from emerging.

**Male lures:** The adult oriental fruit fly is strongly attracted to the chemical methyl eugynol. Traps are normally made from a closed container containing a cotton wool pad which has been saturated with the attractant and a small quantity of insecticide (commonly fipronil). The container has openings in the side to allow males to enter, where they are attracted to the bait pad and killed by the insecticide. Male lures are used primarily as an indicator of fruit fly activity in the area. Increasing numbers of males in the traps indicate that females will also be active in the area and laying in fruit. Male lures can kill large numbers of males but, when used alone, will not reduce fruit fly damage to crops.

**Female bait sprays:** Female fruit flies require protein before they can lay fertile eggs. Bait sprays provide a protein source of hydrolysed yeast combined with an insecticide (once again, commonly fipronil). The females are attracted to the yeast hydrolysate, commonly applied under leaves or on trunks, and are killed before they produce or lay eggs. The key advantage of this technique is that the bait sprays do not have to be applied to the fruit so residues can be avoided. The baits can be applied as a coarse spray to the undersides of leaves, to trunks or lower branches, or on any plants surrounding the orchard as the females will seek out the protein to feed on.

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**Orchard hygiene:** Fruit flies tend to build up large populations in orchards where there is an abundance of fruit being attacked and falling to the ground. By collecting and burying all infested fruit it is possible to minimise the rate of increase of the fruit fly population in an orchard.

**Key points to note:**

1. Male lures alone will not normally reduce fruit fly damage as they do not attract females and there will always be enough males around to fertilise the females.
2. Females can be controlled effectively using protein bait sprays when the male lure traps show there is fruit fly activity.
3. Control will be most effective if neighbouring growers cooperate and use male lures and protein bait sprays over larger areas. This method is called Area Wide Control.

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